ABSTRACT OF THE INVENTION

Improved compositions comprise a polymer and carbon fibers, such as nanotubes. In some embodiments, the carbon fibers, e.g., nanotubes, can be mechanically blended or incorporated into the polymer, while in some embodiments carbon nanotubes also may be covalently bonded to the polymer to form corresponding covalent materials. In particular, the polymer can be covalently bonded to the side walls of the carbon nanotubes to form a composite with particularly desirable mechanical properties. Specifically, the bonding of the polymer to the nanotube sidewall can provide desirable mechanical properties of the composite due to the orientation relative to other types of association between the nanotubes and the polymer. The processing of the nanotubes can be facilitated by the dispersion of the nanotubes in an aqueous solution comprising a hydrophylic polymer, such as ethyl vinyl acetate. A dispersion of nanotubes can be combined with a polymer in an extrusion process to blend the materials under high shear, such as in an extruder. In general, various articles can be formed that take advantage of the properties of the composite materials incorporating a polymer and carbon fibers, such as carbon nanotubes.